

Application No.: 10/030,803

Filing Date: April 9, 2002

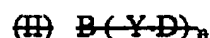
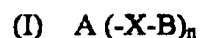
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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A compound of the formula I or II



in which

- A is a hydrophilic, nonionic, linear or branched polymer with a molecular weight of from ~~100~~ 5000 to 10 000 000 g/mol;
- B is a linear or branched polyethyleneimine (PEI) with a molecular weight of from 100 to 1 000 000 g/mol
further comprising a moiety $[A^+]_w$, where A^+ is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine (PEI);
- X is a direct linkage of blocks A and B or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI:
- OC(O)NH(CH₂)_oNHC(O)- with o = 1 to 20,
 - OC(O)NH(aryl)NHC(O)- with aryl = aromatic unit,
 - O(CH₂)_pC(O)- with p = 1 and 3 to 10,
 - OCH₂CH(OH)CH₂-
 - OC(O)-, or
 - O(CH₂)_q- with q = 1 to 20; and
- n is an integer from 1 to 200[;]
- ~~D is a residue of a polyethylene glycol of the formula~~
 ~~$-(CH_2CH_2O)_n- R^+$~~

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~~which is bonded via O and in which n is from 3 to 25 000 and R⁺ is hydrogen-an aliphatic radical or another OH-protective group or a cellular ligand~~

~~Y is a direct linkage of blocks B and D or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI~~

~~-C(O)NH(CH₂)_oNHC(O)O- with o = 1 to 20~~

~~-C(O)NH(aryl)NHC(O)O- with aryl = aromatic unit~~

~~-(CH₂)_tC(O)O- with t = 2 to 10~~

~~-CH₂CH(OH)CH₂O- or~~

~~-(CH₂)_uO- with u = 1 to 20~~

~~with the proviso that the radicals and variables in formula II are defined so that no compounds of the formula I are included thereby.~~

2. (Currently Amended) A compound as claimed in claim 1, in which

A is a hydrophilic, nonionic, linear or branched polymer with a molecular weight of from ~~1000~~ 5000 to 100 000 g/mol;

B is a linear or branched polyethyleneimine (PEI) with a molecular weight of from 400 to 100 000 g/mol

further comprising a moiety [A]^w, where A⁺ is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine (PEI);

X is a direct linkage of blocks A and B or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI:

-OC(O)NH(CH₂)_oNHC(O)- with o = 2 to 10,

-OC(O)NH(aryl)NHC(O)- with aryl = aromatic unit with one nucleus,

-O(CH₂)_pC(O)- with p = 1 ~~to~~ and 3,

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$\text{-OCH}_2\text{CH(OH)CH}_2\text{-}$,
 -OC(O)- , or
 $\text{-O(CH}_2\text{)}_q\text{-}$ with $q = 1$ to 6 , and
 n is an integer from 1 to 50 [[,]]
 D is a residue of a polyethylene glycol of the formula
 $\text{-(CH}_2\text{CH}_2\text{O)}_n\text{-R}^+$
 which is bonded via O and in which n [[']] is from 10 to 5000 [[,]]
 and R^+ is hydrogen[[,]]-an aliphatic radical or another OH-
 protective group or a cellular ligand[[;]]
 \forall is a direct linkage of blocks B and D or a linker with the following
 structures whose C terminal side is linked to a nitrogen atom of the
 PEI [[;]]
 $\text{-C(O)NH(CH}_2\text{)}_6\text{NHC(O)O-}$ with $[O=]$ 2 to 10 [[,]]
 $\text{-C(O)NH(aryl)NHC(O)O-}$ with $\text{aryl}+$ [[=]] aromatic unit with one
 nucleus[[,]]
 $\text{-(CH}_2\text{)}_3\text{C(O)O-}$ with $+$ [[=]] 2 to 3 [[,]]
 $\text{-CH}_2\text{CH(OH)CH}_2\text{O-}$ [[,]]-or
 $\text{-(CH}_2\text{)}_u\text{O-}$ with u [[=]] 1 to 6 [[;]]
 with the proviso that the radicals and variables in formula II are defined so
 that no compounds of the formula I are included thereby.

3. (Currently Amended) A compound as claimed in claim 1, in which

- A is a hydrophilic, nonionic, linear or branched polymer with a molecular weight of from 5000 to $50\,000$ g/mol;
- B is a linear or branched polyethyleneimine (PEI) with a molecular weight of from 400 to $50\,000$ g/mol
further comprising a moiety $[A^+]_w$, where A^+ is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine (PEI);

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X is a direct linkage of blocks A and B or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI:

-OC(O)NH(CH₂)_oNHC(O)- with o = 4 to 6,

-OC(O)NH(aryl)NHC(O)- with aryl = tolyl,

-O(CH₂)_pC(O)- with p = 1,

-OCH₂CH(OH)CH₂-,

-OC(O)-, or

-O(CH₂)_q- with q = 1 to 3; and

n is an integer from 1 to 12[[:]]

~~D is a residue of a polyethylene glycol of the formula~~

~~-(CH₂CH₂O)_n-R⁺~~

~~which is bonded via O and in which n['] is from 10 to 1000[[:]] and~~

~~R⁺ is hydrogen[[:]] an aliphatic radical or another OH protective~~

~~group or a cellular ligand[[:]]~~

~~Y is a direct linkage of blocks B and D or a linker with the following structures whose C terminal side is linked to a nitrogen atom of the PEI[[:]]~~

~~-C(O)NH(CH₂)_oNHC(O)O- with o['] 4 to 6[[:]]~~

~~-C(O)NH(aryl)NHC(O)O- with aryl['] tolyl[[:]]~~

~~-(CH₂)_tC(O)O- with t['] 2[[:]]~~

~~-CH₂CH(OH)CH₂O-[[:]] or~~

~~-(CH₂)_uO- with u['] 1 to 3[[:]]~~

~~with the proviso that the radicals and variables in formula II are defined so that no compounds of the formula I are included thereby.~~

4. (Canceled) Please cancel Claim 4.

5. (Canceled) Please cancel Claim 5.

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6. (Original) A compound as claimed in claim 1, in which X is a linker of the formula $-\text{OC}(\text{O})\text{NH}(\text{CH}_2)_n\text{NHC}(\text{O})-$.

7. (Canceled) Please cancel Claim 7.

8. (Previously Presented) A process for preparing a compound of the formula I as claimed in claim 1, which comprises

a) reacting compounds of the general formula V
(V) $\text{A}-(\text{OH})_n$ with A and n = as in formula I
with diisocyanate and reacting the compound resulting therefrom
with polyethyleneimine

or

b) adding compounds of the general formula VI
(VI) $\text{A}-(\text{NH}_2)_n$ (with A and n = as defined in formula I)
to the reaction mixture for the polymerization of ethyleneimine
before the start of the polymerization or not until the
polymerization is in progress, or

c) employing compounds of the general formula VII

(VII) $\text{A}-(\text{OS}(\text{O})_2\text{R}^4)_n$ with A as in formula I and R^4 = aliphatic or
aromatic radical as macroinitiator for the polymerization of
ethyleneimine.

9. (Canceled) Please cancel Claim 9.

10. (Currently Amended) The method of complexation of polynucleic acids in aqueous systems which comprises contacting a compound of the formula I or II

(I) $\text{A}(-\text{X}-\text{B})_n$ (II) $\text{B}(-\text{Y}-\text{D})_n$

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in which

- A is a hydrophilic, nonionic, linear or branched polymer with a molecular weight of from 100 5000 to 10 000 000 g/mol;
- B is a linear or branched polyethyleneimine (PEI) with a molecular weight of from 100 to 1 000 000 g/mol
further comprising a moiety $[A^-]_w$ where A^- is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine (PEI);
- X is a direct linkage of blocks A and B or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI:
 $-OC(O)NH(CH_2)_oNHC(O)-$ with $o = 1$ to 20,
 $-OC(O)NH(aryl)NHC(O)-$ with aryl = aromatic unit,
 $-O(CH_2)_pC(O)-$ with $p = 1$ and 3 to 10,
 $-OCH_2CH(OH)CH_2-$
 $-OC(O)-$, or
 $-O(CH_2)_q-$ with $q = 1$ to 20; and
- n is an integer from 1 to 200[[:]]
- ~~D is a residue of a polyethylene glycol of the formula~~
 ~~$-(CH_2CH_2O)_n- R^1$~~
~~which is bonded via O and in which n['] is from 3 to 25 000[[:]] and R^1~~
~~is hydrogen, an aliphatic radical or another OH protective group or a cellular ligand[[:]]~~
- ~~Y is a direct linkage of blocks B and D or a linker with the following structures whose C-terminal is linked to a nitrogen atom of the PEI[[:]]~~
 ~~$-C(O)NH(CH_2)_eNHC(O)O-$ with e [=]1 to 20[[:]]~~
 ~~$-C(O)NH(aryl)NHC(O)O-$ with aryl [=]aromatic unit[[:]]~~
 ~~$-(CH_2)_tC(O)O-$ with t [=]2 to 10[[:]]~~

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~~CH₂CH(OH)CH₂O[.]] or~~

~~(CH₂)_uO with u[=]1 to 20[.]]~~

~~with the proviso that the radicals and variables in formula II are defined so that no compounds of the formula I are included thereby with a polynucleic acid.~~

11. (Currently Amended) The method as claimed in claim 10, wherein a compound of the formula I or II, in which

- A is a hydrophilic, nonionic, linear or branched polymer with a molecular weight of from ~~1000~~ 5000 to 100 000 g/mol;
- B is a linear or branched polyethyleneimine (PEI) with a molecular weight of from 400 to 100 000 g/mol[+]
further comprising a moiety [A]_w, where A⁺ is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine (PEI);
- X is a direct linkage of blocks A and B or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI:
 -OC(O)NH(CH₂)_oNHC(O)- with o = 2 to 10,
 -OC(O)NH(aryl)NHC(O)- with aryl = aromatic unit with one nucleus,
 -O(CH₂)_pC(O)- with p = 1 ~~to~~ and 3,
 -OCH₂CH(OH)CH₂-,
 -OC(O)-, or
 -O(CH₂)_q- with q = 1 to 6, and
- n is an integer from 1 to 50[.]]
- D ~~is a residue of a polyethylene glycol of the formula~~
~~-(CH₂CH₂O)_n[']R⁺~~
~~which is bonded via O and in which n[''] is from 10 to 5000[.]] and R⁺ is~~
~~hydrogen[.]] an aliphatic radical or another OH protective group or a~~
~~cellular ligand[[:]]~~

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~~Y is a direct linkage of blocks B and D or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI[[:]]~~
~~-C(O)NH(CH₂)_oNHC(O)O- with o[[:]] 2 to 10[[:]]~~
~~-C(O)NH(aryl)NHC(O)O- with aryl [[:]] aromatic unit with one nucleus[[:]]~~
~~-(CH₂)_tC(O)O- with t[[:]] 2 to 3[[:]]~~
~~-CH₂CH(OH)CH₂O-[[:]]-or~~
~~-(CH₂)_uO- with u[[:]] 1 to 6[[:]]~~
~~with the proviso that the radicals and variables in formula II are defined so that no compounds of the formula I are included thereby[[:]] is used.~~

12. (Currently Amended) The method as claimed in claim 10, wherein a compound of the formula I or H, in which

- A is a hydrophilic, nonionic, linear or branched polymer with a molecular weight of from 5000 to 50 000 g/mol;
- B is a linear or branched polyethyleneimine (PEI) with a molecular weight of from 400 to 50 000 g/mol;
further comprising a moiety [A]_w where A⁺ is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine(PEI);
- X is a direct linkage of blocks A and B or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI:
- OC(O)NH(CH₂)_oNHC(O)- with o = 4 to 6,
 - OC(O)NH(aryl)NHC(O)- with aryl = tolyl,
 - O(CH₂)_pC(O)- with p = 1,
 - OCH₂CH(OH)CH₂-,
 - OC(O)-, or

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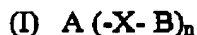
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- $-\text{O}(\text{CH}_2)_q$ with $q = 1$ to 3 ; and
- n is an integer from 1 to 12 [[:]]
- ~~D~~ is a residue of a polyethylene glycol of the formula
- ~~$-(\text{CH}_2\text{CH}_2\text{O})_{n[[,]]}-\text{R}^+$~~
- ~~which is bonded via O and in which $n[[']]$ is from 10 to 1000 [[,]] and R^+ is~~
- ~~hydrogen[[,]] an aliphatic radical or another OH protective group or a~~
- ~~cellular ligand[[,]]~~
- ~~X~~ is a direct linkage of blocks B and D or a linker with the following
- ~~structures whose C-terminal side is linked to a nitrogen atom of the~~
- ~~PEI[[:]]~~
- ~~$-\text{C}(\text{O})\text{NH}(\text{CH}_2)_6\text{NHC}(\text{O})\text{O}-$ with $o[[=]]4$ to 6 [[,]]~~
- ~~$-\text{C}(\text{O})\text{NH}(\text{aryl})\text{NHC}(\text{O})\text{O}-$ with $\text{aryl}[[=]]\text{tolyl}[[,]]$~~
- ~~$-(\text{CH}_2)_2\text{C}(\text{O})\text{O}-$ with $t[[=]]2$ [[,]]~~
- ~~$-\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{O}-$ [[,]] or~~
- ~~$-(\text{CH}_2)_u\text{O}-$ with $u[[=]]1$ to 3 [[:]]~~
- ~~with the proviso that the radicals and variables in formula II are defined so~~
- ~~that no compounds of the formula I are included thereby[[,]] is used.~~

13. (Original) The method of claim 10, wherein the polynucleic acid is DNA.
14. (Withdrawn) The method of claim 10, wherein the polynucleic acid is RNA.
15. (Withdrawn) The method of claim 12, wherein the polynucleic acid is a ribozyme.
16. (Canceled) Please cancel Claim 16.
17. (Canceled)
18. (Canceled) Please cancel Claim 18.

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19. (Currently Amended) The method of complexation of DNA in aqueous systems which comprises contacting a compound of the formula I



in which

- A is a hydrophilic, nonionic, linear or branched polymer with a molecular weight of from ~~100~~ 5000 to 10 000 000 g/mol;
- B is a linear or branched polyethyleneimine (PEI) with a molecular weight of from 100 to 1 000 000 g/mol
further comprising a moiety $[A]_w$ where $[A]$ is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine (PEI);
- X is a direct linkage of blocks A and B or a linker with the following structures whose C-terminal side is linked to a nitrogen atom of the PEI:
-OC(O)NH(CH₂)_oNHC(O)- with o = 1 to 20,
-OC(O)NH(aryl)NHC(O)- with aryl = aromatic unit,
-O(CH₂)_pC(O)- with p = 1 and 3 to 10,
-OCH₂CH(OH)CH₂-
-OC(O)-, or
-O(CH₂)_q- with q = 1 to 20; and
- n is an integer from 1 to 200;
with DNA.

20. (New) A compound according to Claim 1, wherein the hydrophilic, nonionic, branched polymer is a cyclic, star, dendritic, 4-arm, 8-arm or 20-arm polyethylene glycol polymer.

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21. (New) A compound according to Claim 1, wherein the hydrophilic, nonionic, branched polymer is an 8-arm or 20-arm polyethylene glycol polymer.

22. (New) A complex comprising
(i) a compound of the formula I



in which

A is a hydrophilic, non-ionic, branched polyethylene glycol with a molecular weight of from 5000 to 10 000 000 g/mol having 4 or 8 arms or being star-shaped or in a form of a cyclodextrin;

B is a linear or branched polyethyleneimine (PEI) residue with a molecular weight of from 100 to 1 000 000 g/mol further comprising a moiety $[A^-]_w$, where A^- is an equivalent of an anion and w is an integer selected to balance the positive charges in the polyethyleneimine (PEI);

X is $-OC(O)NH(CH_2)_oNHC(O)-$ with o = 1 to 20, and

(ii) polynucleic acid.

23. (New) A compound according to Claim 1, wherein A^+ is selected from OH^+ , Cl^+ or Br^+ .

24. (New) A surfactant comprising a compound according to Claim 1.